

NOTES ON THE ETHOLOGY OF *PROCTACANTHUS NEARNO*
(DIPTERA: ASILIDAE) IN MEXICO^{1,2}

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Abstract.—*Proctacanthus nearno* Martin was studied in a mesquite savannah near Jimenez, Chihuahua, Mexico, where it foraged from the ground or vegetation. Prey were captured in flight or as they were landing on the ground. The method used by this asilid species in manipulating prey during feeding depended upon prey size. Five prey in the orders Diptera, Homoptera and Orthoptera were recovered. *Proctacanthus nearno* mated in the male-over-female position.

Proctacanthus nearno Martin is a large (about 28 mm long), brownish-black robber fly. Males and females are morphologically similar except for genitalic structure. The male claspers are sparsely white pollinose, whereas the female's ovipositor is shiny, reddish black, and cylindrical with a distinct apical cirlet of black spines (Martin, 1962).

The behavior of this species was observed along a dry stream bed at the edge of agricultural land, 7 km north of Jimenez, Chihuahua, Mexico, at an altitude of approximately 1,500 m above sea level. The habitat is a southern desert grassland (with two dominant grass genera, *Bouteloua* and *Aristida*), invaded by mesquite (*Prosopis*).

Proctacanthus nearno foraged from both ground and vegetation, depending upon the temperature of the soil surface. When the temperature of the soil surface was less than 32 to 38°C, this species foraged from the ground in a flattened position, broadside to the sun. As the temperature of the soil surface increased to about 45°C, *P. nearno* took a more or less flattened position, but faced the sun. Once the soil surface temperature exceeded

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45°C, this species stood up on its tarsi with its body held high above the ground or flew to a position on the vegetation about 1 to 2 m above the ground. When on vegetation, *P. nearno* assumed a position similar to that of *P. micans* Schiner (Dennis and Lavigne, 1975), with its body at a 45° angle to the vertical or pressed against the vegetation.

When actively engaged in foraging, *P. nearno* would make several forage flights from the same site. Like *P. micans*, *P. nearno* is a strong flyer and usually made relatively long forage flights of 2 to 6 m. When changing foraging site, specimens generally flew 4 to 7 m to a new location on the ground or vegetation.

Proctacanthus nearno captured most of its prey in flight 2 to 3 m in front of and above its foraging site. However, a few prey were captured as they were landing on the ground, as reported previously for *Efferia varipes* (Williston) (Dennis and Lavigne, 1976). Some potential prey were released shortly after contact was made, presumably because of some undesirable characteristics. When prey were not released, *P. nearno* inserted its hypopharynx into the prey's thorax during a hover flight before landing to feed. Similar behavior during prey capture has been reported for other species of *Proctacanthus* (Baker and Fischer, 1975; Dennis and Lavigne, 1975).

As *P. nearno* fed, the method by which it manipulated prey depended on prey size. Small prey, less than 9.0 mm in length, were manipulated with all tarsi as the asilid hovered above its feeding site. Larger prey, such as Cicadidae (Fig. 1) with a total length of 32.0 mm, were manipulated with a combination of tarsi as the asilid held onto vegetation with one or two tarsi. One female was also observed removing her hypopharynx from her prey during flight and reinserting it prior to landing at a new feeding site. This aspect of asilid behavior has not been recorded previously.

Only two complete feedings were observed. A male *P. nearno* fed on *Eupeodes volucris* Osten Sacken (Syrphidae) for 39 min and a female fed on a Cicadidae for 2 hr, 16 min. A second female was observed to feed on a male *Derotmena haydenii* (Thomas) (Acrididae) for 2 hr, 32 min, before being lost to observer's sight as she changed feeding sites. The extreme length of feeding times suggests that few prey are taken on a given day. Other species of *Proctacanthus* (Baker and Fischer, 1975; Dennis and Lavigne, 1975) have been estimated to feed on 3 to 7 prey per day.

At the completion of feeding, *P. nearno* allowed prey to drop off its hypopharynx either at the feeding site or in flight shortly after leaving the feeding site.

Five prey were recovered from *P. nearno* on May 28, 1973; prey size and predator sex is indicated in parentheses following the prey identification.—DIPTERA, Sarcophagidae: *Sarcophaga* sp. (6.0 mm, ♀); Syrphidae: *Eupeodes volucris* O. S. (8.9 mm, ♂); Tachinidae: *Stomatomyia parvipalpis*



Fig. 1. Female *Proctacanthus nearno* feeding on an unidentified cicada. Fig. 2. Mated pair of *Proctacanthus nearno* resting on vegetation.

(Wulp) (7.2 mm, ♂); HOMOPTERA, Cicadidae: unidentified (32.0 mm, ♂); ORTHOPTERA, Acrididae: *Derotmena haydenii* (Thomas) (20.0 mm ♀).

Other species of *Proctacanthus* feed on a wide variety of prey from the orders Coleoptera, Diptera, Hemiptera, Homoptera, Hymenoptera, Lepidoptera, Neuroptera, Odonata, and Orthoptera (Baker and Fischer, 1975; Bouseman and Maier, 1977; Bromley, 1923, 1931, 1934, 1946, 1947, 1949, 1950; Dennis and Lavigne, 1975; Rogers and Lavigne, 1972).

Only two mating pairs were observed. We did not observe any courtship behavior by either males or females of *P. nearno* prior to mating. However, males probably exhibit searching flights for receptive females as observed for *P. micans* (Dennis and Lavigne, 1975).

The activity pattern of a male was being observed when he flew into dense vegetation, reappeared within a few seconds, and copulated with a female in the male-over-female position. It is assumed that this mating was initiated while the female was resting on a bush. While in the male-over-female position, the male's abdomen curved around either side of the female's abdomen and clasped the genitalia from below. The female's wings were spread at about a 45° angle to her body, whereas the male's wings were closed over his dorsum. In this position, the female's wings passed under the male's fore legs and over his mid legs. The male's fore tarsi rested upon the female's eyes, and his mid and hind tarsi either clasped the female or the vegetation below the female. While in copulo, male *P. micans* rub the females' eyes with their fore tarsi (Dennis and Lavigne, 1975); however, this behavior was not observed for *P. nearno*.

Shortly after the initiation of mating the mating pair assumed the tail-to-tail position (Fig. 2). However, after 12 min, the pair flew into the air, hit some vegetation, and separated. A second mated pair acted similarly, changing from the male-over-female position to the tail-to-tail position after less than a minute. In this instance, initiation of mating occurred in flight and separation occurred 12 min later when the pair, having been disturbed, flew and landed on vegetation only to separate immediately. According to Dennis and Lavigne (1975), the duration of *P. micans*' matings, which are initiated both in flight and on vegetation, were shortened when mating pairs straightened out in the tail-to-tail position. *Proctacanthus nearno* may function similarly, so we question whether the observed matings were complete. The observed matings occurred at 5:32 and 5:55 PM, when the air temperature at the asilids' height was approximately 35.5°C (in sunlight) and 31.5°C (in shade), respectively.

Oviposition by female *P. nearno* was not observed. Like other species of *Proctacanthus* (Bromley, 1946), *P. nearno* females possess spines on their ovipositors and undoubtedly oviposit in the ground, as do females of *P. micans* (Rogers and Lavigne, 1972; Dennis and Lavigne, 1975).

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